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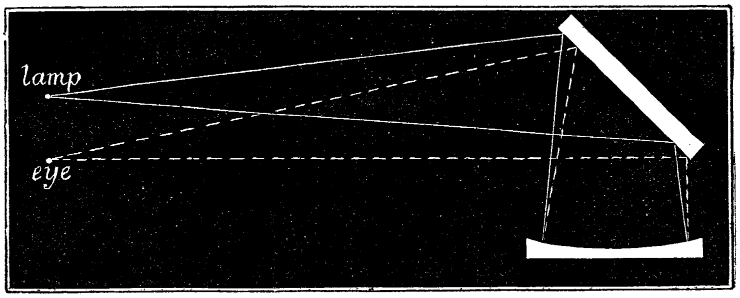
the concave may have can be separated from the errors of the flat by rotating the one or the other and so taken account of.



The diagram given shows at once the arrangement, from which it will be seen that in this case the plane mirror receives the light from the lamps and from the mirror also, so that any error of the plane mirror would be doubled before reaching the eye.

In order to use this plan the method of testing concave surfaces described by Foucault must be thoroughly understood, as the one is only an extension of the other, and the pinhole, the straight line or system of squares, and the screen are to be used exactly as testing a concave mirror, but the whole of the testing can be done at the centre of curvature, and if a strictly spherical mirror be used the test can be made almost a rigid one.

Notes on the Solar Surface of 1887. By S. J. Perry, D.Sc., F.R.S.

Having just completed the measurement of the Sun's spot-area observed at Stonyhurst in 1887, I thought that some of the results might fitly be brought at once before the Society. The number of days in each month in which drawings were obtained was respectively 11, 18, 24, 22, 22, 28, 30, 25, 21, 23, 17, and 18, making a total of 259 days in the course of the twelve months.

When the areas had been reduced to millionths of the solar hemisphere and represented graphically, the first point that struck the eye was the prolongation of the minimum period during the first four months of the year, with its sudden cessation at the opening of May. We have thus already in this eleven-year period two minima, one lasting from September 22 to December 8 of 1886, or for two months and a half, and the other extending over the first third of 1887, more than twice as many days without spots being noted in the second period than in the first. But if we include both these periods in the same minimum, by neglecting the interruption at the close of 1886, then the whole minimum period includes 222 days, and the date of the minimum may be given approximately as January 10, 1887. In thus speaking of the minimum I do not wish it to be inferred

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that the absolute minimum of the eleven-year period was reached on January 10, 1887. It would, of course, be premature to venture upon such an assertion, as we may not unreasonably look forward to even longer periods of solar inactivity during the years 1888 and 1889 than that which marked the end of 1886 and the beginning of 1887.

From May to August of the year that has just expired there was a considerable wave of disturbance corresponding to each rotation of the Sun, and these differed little in extent, although they were by no means periodic returns of the same groups to the visible hemisphere. For most of the larger spots and groups of spots have this year lasted but for a short time; one group only—namely, that which was first observed on January 27—having lasted for part of three revolutions. This group was finally observed as three small dots on March 22, but the faculæ of the group were still a conspicuous object during the next rotation. On seven days only was the Sun observed to be free from spots between May 1 and August 24, but from this date until November 30 the solar surface was more quiet, and thirty-five days are recorded as spotless. During the last month the spotted area has been larger than in any month since May 1886, December 15 being the date of the recent secondary maximum. The group visible from July 22 to the 30th was a typical case of the formation of a spot, the slight dot surrounded by a few faculæ being the first indication of the coming disturbance.

I should like for a moment to call attention to the secondary maximum that occurred in 1886, as there exists a marked difference between the results published by Wolf and by Tacchini; most of the results given by the former pointing to the beginning of March, and the latter giving April 1 as the date of the maximum. The Stonyhurst curve shows three maxima in 1886 in the following order as regards magnitude: March 8, May 2, and April 2, the spot area in millionths of the hemisphere being respectively 2,459, 2,274, and 1,575. As observations were very frequent at all these dates, and the results of consecutive days hold well together, I can scarcely believe that the state of the sky will suffice to account for such great discrepancies as would have to be admitted in order to accept the date of Prof. Tacchini.

Another point of some interest is the behaviour of the veiled spots during the period of minimum. These spots have for convenience of record been divided into three classes. The first class comprises those misty patches, large in extent, but of very short duration, which give an appearance of bad definition to whole regions of the solar surface. These, which were frequent about the time of maximum, have scarcely been seen at all this year. The second class, consisting of penumbral dots, which increase in size and then coalesce with other similar spots in their immediate neighbourhood, the total duration of any single spot never much exceeding three minutes, have been as frequent and as easily seen this year as they ever were before, but the

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changes they have undergone during their short existence have not been so extended lately as in previous years. The third class of veiled spots, which differ from the two other classes in being confined to the spot zones, in their duration extending sometimes to several days, and in their close resemblance to minute patches of penumbra, have been observed this year rather less often than in 1883 and 1884. These faint objects have been examined both on the projected image and directly by aid of a solar prism and a Dawes eyepiece, and it is invariably found not only that the observation is far more easy, but more perfect in every way when the Sun is viewed by projection.

On October 28, at $9^h\ 5^m$, a few faculæ attached to a group of faint spots became on a sudden intensely bright, and faded again as quickly as they had shone out.* During this appearance no other change of any importance occurred in the spots themselves or in their neighbourhood. Within three minutes both the faculæ and the spots had entirely disappeared. I may mention in conclusion that, although there have been this year many days without true spots, the Sun's surface has but rarely been entirely free from faculæ, which, however, were sometimes very faint.

Nebula in Andromeda and Nova, 1885. By T. W. Backhouse.

I. *Magnitude of Nova.*

The few observations I took of *Nova*, 1885, quite confirm the remark of Dr. Copeland in his paper in *Monthly Notices*, xlvii. p. 55, that lower powers showed it brighter than higher ones. The comparison stars and their magnitudes, as given in the *Durchmusterung*, as well as the adopted magnitudes based on these from estimates, are shown in the following table :—

No. in D.M.	Mag. in D.M.	Magnitude adopted.
40°, 158	7·5	7·25
39, 167	7·1	7·46
39, 166	8·5	8·69
41, 149	9·1	8·91
40, 145	9·0	9·02

The resulting magnitude of *Nova* with the different powers, 9 being the finder of telescope, and the other figures the approximate powers used on a 4¼-inch refractor, is as follows :—

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* The Stonyhurst Magnetograms do not show any trace of this solar disturbance.